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(54) Material for footwear insoles

(57) This invention relates to thermally insulating material combining comfort and heat reflecting properties, comprising a cushioning layer, a heat reflecting layer adjacent the cushioning layer, and spacer means adjacent the heat reflecting layer to provide an air space between the reflecting layer and a solid surface. Optionally an arrangement can be made for transpiration by providing holes through layers that are non-porous. The material is particularly suitable for use as a thermally insulating insole for footwear.

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The claims were filed later than the filing date within the period prescribed by Rule 25(1) of the Patents Rules 1982.

SPECIFICATION

Insoles for Articles of Footwear

This invention relates to insoles for use in articles of footwear. In addition to various known types of foot insoles made for example of cork and fabric; leather or leatherette top with latex foam etc., there are insoles whose purpose is not only to provide foot-comfort but also thermal insulation. In the known types of insoles where thermal insulation is one of the main objectives, an insulating layer is incorporated as for example foam plastic, or foam latex with one of the above mentioned materials, by way of a multi-layer laminate. One or more of such layers may contain perforations. In one such type of insole in particular (UK 1,539,631), an additional thin layer of an aluminised polymer acts as a moisture barrier. In this type of insole the said aluminised layer is situate either at the bottom of the insole, and thus in contact over a greater part of its surface with the inside sole lining of the footwear, or between two other layers of a multi-layer laminate. In either case the process of heat transfer is governed by conduction between the foot on the one hand and the outside environment on the other. In fact, thermal conduction is the governing process also in other types of thermally insulating insoles. Consequently, whatever materials are used, the thermal insulating effect is dependent to a very large extent upon the thickness of the materials used. This may cause problems for comfort, because of the feeling of squeezing the foot if a thick insole is provided for high thermal insulation.

According to the invention an insole for footwear consists of an upper part formed of any of the materials commonly known in the trade, as a single layer or in any combination as a multi-layer, and laminated to this upper part is a thin layer of metallised (e.g. aluminised) polymeric material characterised by low emissivity in the infra-red region of radiation. This low emissivity i.e. heat-reflecting layer is arranged in such a manner that in use it faces downwards i.e. in opposition to the inside sole lining of the footwear. Furthermore, interposed between the footwear sole lining and the said heat-reflecting layer of the insole a spacer means is provided, consisting of an open mesh and/or perforated material whose area of contact with the heat-reflecting surface of the insole is preferably less than 50% of the total bottom surface area of the insole. Optionally, the said spacer means may form part of the bottom of the insole, adhering to the heat-reflecting layer. The layers are preferably of or may include thermoplastic heat sealable materials and/or adhesives to aid lamination.

By way of example, in one embodiment of the heat-reflecting insole according to the invention, a perforated spacer means consists of a 1.5 to 2.2 mm thick cross-linked expanded polyethylene sheet with a density range of between 100 and 200 k/m^3. This spacer contains perforations by way of holes between 2.5 mm and 3.2 mm dia. leaving an open area of app. 60% of the total surface area facing the spacer. Laminated to the perforated spacer on one side is a paper thin aluminised polymer (e.g. polyester film) with its low emissivity layer facing outwards, visibly through the perforations. Adhering to the obverse side of the aluminised layer is a thin cushioning layer of soft latex and/or open cell flexible plastic foam forming an intermediate layer with a thin layer of fabric and/or a thin leather layer, forming the outside. In use, this outside fabric or leather layer is in contact with the plantar surface of the foot or sock or stocking, whilst the perforated spacer forms the bottom of the insole. Such an insulating multi-layer insole may be as thin as 2.8 to 3.8 mm.

By way of another example, according to the invention, a heat reflecting insole additionally allows for transpiration of moisture and/or water vapour. This is achieved through the provision of additional 'secondary' perforations through the multi-layer insole. However, these secondary perforations need not be pierced through the whole section of the multi-layered insole where, for example the top layer or layers are themselves capable of transpiration (e.g. leather). In such a case the secondary perforations may stop short of such an upper layer, but would still be pierced through all other layers underneath. The additional 'secondary' perforations according to the example consist of holes of 2 mm to 5 mm dia. whose total surface area is between 4 and 10% of the surface area of the insole.

In the process of heat transfer between the foot of the wearer and the outside environment through the footwear, the insole according to the invention acts not only through the very high resistance to thermal conduction of any insulating layers incorporated, but also by way of reducing heat losses through radiation. This enhancement in heat insulation is made possible by the provision, according to the invention, of a low emissivity heat reflecting layer in conjunction with spacer means, at the bottom of the insole.

CLAIMS

1. A thermally insulating material combining comfort and heat reflecting properties comprising:
   a) A cushioning layer
   b) A heat reflecting layer adjacent the cushioning layer and
   c) Spacer means adjacent the heat reflecting layer to provide an air space between the reflecting layer and a solid surface.

2. Material according to Claim 1, further comprising a comfort layer adjacent the cushioning layer.

3. Material according to Claim 2 wherein the comfort layer comprises brushed nylon.

4. Material according to any preceding Claim wherein the heat reflecting layer is metal containing material.

5. Material according to Claim 4 wherein the heat reflecting layer is aluminium foil.

6. Material according to Claim 4 wherein the heat reflecting layer is metallised polymeric material.

7. Material according to any preceding Claim, wherein the spacer means is perforated material.

8. Material according to Claim 7 wherein the perforated material is perforated foam plastic.

9. Material according to any preceding Claim, wherein the spacer means is netting.

10. Material according to any preceding Claim wherein the cushioning material is flexible foam plastic.

11. Material according to any preceding Claim wherein the layers are bonded together.

12. Material according to any preceding Claim wherein means are provided for allowing transpiration through the material.

13. Material according to Claim 12 wherein the transpiration allowing means are holes in one or more of the layers.

14. Material substantially as hereinbefore described with reference to the examples.

15. A thermally insulating insole for footwear comprising material according to any preceding Claim.

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